

SEQUEN~1.TXT
SEQUENCE LISTING

<110> Cassetti, Maria C.
Smith, Larry
Jeffrey K. Pullen
Susan P. McElhiney

<120> HUMAN PAPILLOMAVIRUS POLYPEPTIDES AND IMMUNOGENIC COMPOSITIONS

<130> 00630/100M137-US2

<150> PCT/US2003/031726
<151> 2003-10-02

<150> US 60/415,929
<151> 2002-10-03

<160> 65

<170> PatentIn version 3.1

<210> 1
<211> 248
<212> PRT
<213> Human papillomavirus type 16

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Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr
20 25 30

Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg
35 40 45

Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys Asp
50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys
65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu
85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys Pro
100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile
115 120 125

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg
130 135 140

SEQUEN~1.TXT

Thr Arg Arg Glu Thr Gln Leu His Gly Asp Thr Pro Thr Leu His Glu
145 150 155 160

Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu
165 170 175

Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala
180 185 190

Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys
195 200 205

Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val
210 215 220

Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val
225 230 235 240

Cys Pro Ile Cys Ser Gln Lys Pro
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<213> Human papillomavirus type 16

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<210> 3

SEQUEN~1.TXT

<211> 248
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 <213> Human papillomavirus type 16

<400> 3

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Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr
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Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg
 35 40 45

Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly Asp
 50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys
 65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu
 85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys Pro
 100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile
 115 120 125

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg
 130 135 140

Thr Arg Arg Glu Thr Gln Leu His Gly Asp Thr Pro Thr Leu His Glu
 145 150 155 160

Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly
 165 170 175

Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala
 180 185 190

Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys
 195 200 205

Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val
 210 215 220

Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val
 Page 3

225

230

Cys Pro Ile Cys Ser Gln Lys Pro
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<210> 4
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<212> DNA
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<213> Human papillomavirus type 16

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20 25 30
Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg
35 40 45
Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly Asp
50 55 60

SEQUEN~1.TXT

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys
 65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu
 85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys Pro
 100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile
 115 120 125

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg
 130 135 140

Thr Arg Arg Glu Thr Gln Leu His Gly Asp Thr Pro Thr Leu His Glu
 145 150 155 160

Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly
 165 170 175

Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala
 180 185 190

Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys
 195 200 205

Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val
 210 215 220

Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val
 225 230 235 240

Gly Pro Ile Cys Ser Gln Lys Pro
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<210> 6
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| gaggtatatg actttgcttt tcgggattta tgcatagtat atagagatgg gaatccatat | 180 |
| gctgtaggtg ataaatgttt aaagttttat tctaaaatta gtgagtatag acattattgt | 240 |
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Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln
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Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser
 20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp
 35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu
 65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln
 85 90 95

Lys Pro Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
 100 105 110

Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
 115 120 125

Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
 130 135 140

Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys
 145 150 155 160

SEQUEN~1.TXT

Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
165 170 175

Cys Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
180 185 190

Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys
195 200 205

Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
210 215 220

Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser
225 230 235 240

Arg Thr Arg Arg Glu Thr Gln Leu
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<213> Human papillomavirus type 16

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<210> 9
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<213> Human papillomavirus type 16

SEQUEN~1.TXT

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Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly Gln Leu Asn Asp Ser Ser
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35 40 45
Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr
50 55 60
Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu
65 70 75 80
Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln
85 90 95
Lys Pro Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
100 105 110
Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
115 120 125
Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
130 135 140
Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly
145 150 155 160
Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
165 170 175
Cys Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
180 185 190
Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys
195 200 205
Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
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Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser
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agaacacgta gagaaacca gctgtaa 747

<210> 11
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<212> PRT
<213> Human papillomavirus type 16

<400> 11

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln
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Pro Glu Thr Thr Asp Leu Tyr Gly Tyr Gly Gln Leu Asn Asp Ser Ser
20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp
35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr
50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu
65 70 75 80

SEQUEN~1.TXT

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Gly Pro Ile Cys Ser Gln
85 90 95

Lys Pro Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
100 105 110

Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
115 120 125

Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
130 135 140

Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Gly
145 150 155 160

Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
165 170 175

Cys Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
180 185 190

Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Gly Gln Lys Pro Leu Cys
195 200 205

Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
210 215 220

Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser
225 230 235 240

Arg Thr Arg Arg Glu Thr Gln Leu
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tgtgactcta cgcttcgggt gtgcgtacaa agcacacacg tagacattcg tactttggaa 240
gacctgttaa tgggcacact aggaattgtg ggccccatct gttctcagaa accatttcag 300
gaccacagg agcgaccag aaagttacca cagttatgca cagagctgca aacaactata 360

SEQUEN~1.TXT

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gataaatggt taaagtttta ttctaaaatt agtgagtata gacattattg ttatagtgtg 540
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attaacgggtc aaaagccact gtgtcctgaa gaaaagcaaa gacatctgga caaaaagcaa 660
agattccata atataagggg tcggtggacc ggtcgaatga tgtcttggtg cagatcatca 720
agaacacgta gagaaacca gctgtaa 747

<210> 13
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<212> PRT
<213> Human papillomavirus type 16

<400> 13

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Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val Tyr
20 25 30

Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe Arg
35 40 45

Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys Asp
50 55 60

Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr Cys
65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro Leu
85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys Pro
100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn Ile
115 120 125

Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser Arg
130 135 140

Thr Arg Arg Glu Thr Gln Leu
145 150

<210> 14

SEQUEN~1.TXT

<211> 98
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 <213> Human papillomavirus type 16

<400> 14

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln
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Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser
 20 25 30

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp
 35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu
 65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln
 85 90 95

Lys Pro

<210> 15
 <211> 158
 <212> PRT
 <213> Human papillomavirus type 18

<400> 15

Met Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp
 1 5 10 15

Leu Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys
 20 25 30

Val Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala
 35 40 45

Phe Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala
 50 55 60

Cys His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His
 65 70 75 80

Tyr Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr
 85 90 95

SEQUEN~1.TXT

Gly Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu
100 105 110

Asn Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His
115 120 125

Asn Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg
130 135 140

Ala Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val
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<210> 16
<211> 149
<212> PRT
<213> Human papillomavirus type 31

<400> 16

Met Phe Lys Asn Pro Ala Glu Arg Pro Arg Lys Leu His Glu Leu Ser
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Ser Ala Leu Glu Ile Pro Tyr Asp Glu Leu Arg Leu Asn Cys Val Tyr
20 25 30

Cys Lys Gly Gln Leu Thr Glu Thr Glu Val Leu Asp Phe Ala Phe Thr
35 40 45

Asp Leu Thr Ile Val Tyr Arg Asp Asp Thr Pro His Gly Val Cys Thr
50 55 60

Lys Cys Leu Arg Phe Tyr Ser Lys Val Ser Glu Phe Arg Trp Tyr Arg
65 70 75 80

Tyr Ser Val Tyr Gly Thr Thr Leu Glu Lys Leu Thr Asn Lys Gly Ile
85 90 95

Cys Asp Leu Leu Ile Arg Cys Ile Thr Cys Gln Arg Pro Leu Cys Pro
100 105 110

Glu Glu Lys Gln Arg His Leu Asp Lys Lys Lys Arg Phe His Asn Ile
115 120 125

Gly Gly Arg Trp Thr Gly Arg Cys Ile Ala Cys Trp Arg Arg Pro Arg
130 135 140

Thr Glu Thr Gln Val
145

SEQUEN~1.TXT

<210> 17
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 <212> PRT
 <213> Human papillomavirus type 33

<400> 17

Met Phe Gln Asp Thr Glu Glu Lys Pro Arg Thr Leu His Asp Leu Cys
 1 5 10 15

Gln Ala Leu Glu Thr Thr Ile His Asn Ile Glu Leu Gln Cys Val Glu
 20 25 30

Cys Lys Lys Pro Leu Gln Arg Ser Glu Val Tyr Asp Phe Ala Phe Ala
 35 40 45

Asp Leu Thr Val Val Tyr Arg Glu Gly Asn Pro Phe Gly Ile Cys Lys
 50 55 60

Leu Cys Leu Arg Phe Leu Ser Lys Ile Ser Glu Tyr Arg His Tyr Asn
 65 70 75 80

Tyr Ser Val Tyr Gly Asn Thr Leu Glu Gln Thr Val Lys Lys Pro Leu
 85 90 95

Asn Glu Ile Leu Ile Arg Cys Ile Ile Cys Gln Arg Pro Leu Cys Pro
 100 105 110

Gln Glu Lys Lys Arg His Val Asp Leu Asn Lys Arg Phe His Asn Ile
 115 120 125

Ser Gly Arg Trp Ala Gly Arg Cys Ala Ala Cys Trp Arg Ser Arg Arg
 130 135 140

Arg Glu Thr Ala Leu
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<210> 18
 <211> 149
 <212> PRT
 <213> Human papillomavirus type 35

<400> 18

Met Phe Gln Asp Pro Ala Glu Arg Pro Tyr Lys Leu His Asp Leu Cys
 1 5 10 15

Asn Glu Val Glu Glu Ser Ile His Glu Ile Cys Leu Asn Cys Val Tyr
 20 25 30

SEQUEN~1.TXT

Cys Lys Gln Glu Leu Gln Arg Ser Glu Val Tyr Asp Phe Ala Cys Tyr
 35 40 45
 Asp Leu Cys Ile Val Tyr Arg Glu Gly Gln Pro Tyr Gly Val Cys Met
 50 55 60
 Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg Trp Tyr Arg
 65 70 75 80
 Tyr Ser Val Tyr Gly Glu Thr Leu Glu Lys Gln Cys Asn Lys Gln Leu
 85 90 95
 Cys His Leu Leu Ile Arg Cys Ile Thr Cys Gln Lys Pro Leu Cys Pro
 100 105 110
 Val Glu Lys Gln Arg His Leu Glu Glu Lys Lys Arg Phe His Asn Ile
 115 120 125
 Gly Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Trp Lys Pro Thr Arg
 130 135 140
 Arg Glu Thr Glu Val
 145
 <210> 19
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 <213> Human papillomavirus type 39
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 20 25 30
 Val Tyr Cys Arg Arg Pro Leu Gln Gln Thr Glu Val Tyr Glu Phe Ala
 35 40 45
 Phe Ser Asp Leu Tyr Val Val Tyr Arg Asp Gly Glu Pro Leu Ala Ala
 50 55 60
 Cys Gln Ser Cys Ile Lys Phe Tyr Ala Lys Ile Arg Glu Leu Arg Tyr
 65 70 75 80
 Tyr Ser Asp Ser Val Tyr Ala Thr Thr Leu Glu Asn Ile Thr Asn Thr
 85 90 95

SEQUEN~1.TXT

Lys Leu Tyr Asn Leu Leu Ile Arg Cys Met Cys Cys Leu Lys Pro Leu
100 105 110

Cys Pro Ala Glu Lys Leu Arg His Leu Asn Ser Lys Arg Arg Phe His
115 120 125

Lys Ile Ala Gly Ser Tyr Thr Gly Gln Cys Arg Arg Cys Trp Thr Thr
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Lys Arg Glu Asp Arg Arg Leu Thr Arg Arg Glu Thr Gln Val
145 150 155

<210> 20
<211> 158
<212> PRT
<213> Human papillomavirus type 45

<400> 20

Met Ala Arg Phe Asp Asp Pro Lys Gln Arg Pro Tyr Lys Leu Pro Asp
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20 25 30

Val Tyr Cys Lys Ala Thr Leu Glu Arg Thr Glu Val Tyr Gln Phe Ala
35 40 45

Phe Lys Asp Leu Cys Ile Val Tyr Arg Asp Cys Ile Ala Tyr Ala Ala
50 55 60

Cys His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg Tyr
65 70 75 80

Tyr Ser Asn Ser Val Tyr Gly Glu Thr Leu Glu Lys Ile Thr Asn Thr
85 90 95

Glu Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu
100 105 110

Asn Pro Ala Glu Lys Arg Arg His Leu Lys Asp Lys Arg Arg Phe His
115 120 125

Ser Ile Ala Gly Gln Tyr Arg Gly Gln Cys Asn Thr Cys Cys Asp Gln
130 135 140

Ala Arg Gln Glu Arg Leu Arg Arg Arg Arg Glu Thr Gln Val
145 150 155

SEQUEN~1.TXT

<210> 21
 <211> 151
 <212> PRT
 <213> Human papillomavirus type 51

<400> 21

Met Phe Glu Asp Lys Arg Glu Arg Pro Arg Thr Leu His Glu Leu Cys
 1 5 10 15

Glu Ala Leu Asn Val Ser Met His Asn Ile Gln Val Val Cys Val Tyr
 20 25 30

Cys Lys Lys Glu Leu Cys Arg Ala Asp Val Tyr Asn Val Ala Phe Thr
 35 40 45

Glu Ile Lys Ile Val Tyr Arg Asp Asn Asn Pro Tyr Ala Val Cys Lys
 50 55 60

Gln Cys Leu Leu Phe Tyr Ser Lys Ile Arg Glu Tyr Arg Arg Tyr Ser
 65 70 75 80

Arg Ser Val Tyr Gly Thr Thr Leu Glu Ala Ile Thr Lys Lys Ser Leu
 85 90 95

Tyr Asp Leu Ser Ile Arg Cys His Arg Cys Gln Arg Pro Leu Gly Pro
 100 105 110

Glu Glu Lys Gln Lys Leu Val Asp Glu Lys Lys Arg Phe His Glu Ile
 115 120 125

Ala Gly Arg Trp Thr Gly Gln Cys Ala Asn Cys Trp Gln Arg Thr Arg
 130 135 140

Gln Arg Asn Glu Thr Gln Val
 145 150

<210> 22
 <211> 148
 <212> PRT
 <213> Human papillomavirus type 52

<400> 22

Met Phe Glu Asp Pro Ala Thr Arg Pro Arg Thr Leu His Glu Leu Cys
 1 5 10 15

Glu Val Leu Glu Glu Ser Val His Glu Ile Arg Leu Gln Cys Val Gln
 20 25 30

SEQUEN~1.TXT

Cys Lys Lys Glu Leu Gln Arg Arg Glu Val Tyr Lys Phe Leu Phe Thr
35 40 45

Asp Leu Arg Ile Val Tyr Arg Asp Asn Asn Pro Tyr Gly Val Cys Ile
50 55 60

Met Cys Leu Arg Phe Leu Ser Lys Ile Ser Glu Tyr Arg His Tyr Gln
65 70 75 80

Tyr Ser Leu Tyr Gly Lys Thr Leu Glu Glu Arg Val Lys Lys Pro Leu
85 90 95

Ser Glu Ile Thr Ile Arg Cys Ile Ile Cys Gln Thr Pro Leu Cys Pro
100 105 110

Glu Glu Lys Glu Arg His Val Asn Ala Asn Lys Arg Phe His Asn Ile
115 120 125

Met Gly Arg Trp Thr Gly Arg Cys Ser Glu Cys Trp Arg Pro Arg Pro
130 135 140

Val Thr Gln Val
145

<210> 23
<211> 155
<212> PRT
<213> Human papillomavirus type 56

<400> 23

Met Glu Pro Gln Phe Asn Asn Pro Gln Glu Arg Pro Arg Ser Leu His
1 5 10 15

His Leu Ser Glu Val Leu Glu Ile Pro Leu Ile Asp Leu Arg Leu Ser
20 25 30

Cys Val Tyr Cys Lys Lys Glu Leu Thr Arg Ala Glu Val Tyr Asn Phe
35 40 45

Ala Cys Thr Glu Leu Lys Leu Val Tyr Arg Asp Asp Phe Pro Tyr Ala
50 55 60

Val Cys Arg Val Cys Leu Leu Phe Tyr Ser Lys Val Arg Lys Tyr Arg
65 70 75 80

Tyr Tyr Asp Tyr Ser Val Tyr Gly Ala Thr Leu Glu Ser Ile Thr Lys
85 90 95

SEQUEN~1.TXT

Lys Gln Leu Cys Asp Leu Leu Ile Arg Cys Tyr Arg Cys Gln Ser Pro
100 105 110

Leu Thr Pro Glu Glu Lys Gln Leu His Cys Asp Arg Lys Arg Arg Phe
115 120 125

His Leu Ile Ala His Gly Trp Thr Gly Ser Cys Leu Gly Cys Trp Arg
130 135 140

Gln Thr Ser Arg Glu Pro Arg Glu Ser Thr Val
145 150 155

<210> 24
<211> 149
<212> PRT
<213> Human papillomavirus type 58

<400> 24

Met Phe Gln Asp Ala Glu Glu Lys Pro Arg Thr Leu His Asp Leu Cys
1 5 10 15

Gln Ala Leu Glu Thr Ser Val His Glu Ile Glu Leu Lys Cys Val Glu
20 25 30

Cys Lys Lys Thr Leu Gln Arg Ser Glu Val Tyr Asp Phe Val Phe Ala
35 40 45

Asp Leu Arg Ile Val Tyr Arg Asp Gly Asn Pro Phe Ala Val Cys Lys
50 55 60

Val Cys Leu Arg Leu Leu Ser Lys Ile Ser Glu Tyr Arg His Tyr Asn
65 70 75 80

Tyr Ser Leu Tyr Gly Asp Thr Leu Glu Gln Thr Leu Lys Lys Cys Leu
85 90 95

Asn Glu Ile Leu Ile Arg Cys Ile Ile Cys Gln Arg Pro Leu Cys Pro
100 105 110

Gln Glu Lys Lys Arg His Val Asp Leu Asn Lys Arg Phe His Asn Ile
115 120 125

Ser Gly Arg Trp Thr Gly Arg Cys Ala Val Cys Trp Arg Pro Arg Arg
130 135 140

Arg Gln Thr Gln Val
145

SEQUEN~1.TXT

<210> 25
 <211> 160
 <212> PRT
 <213> Human papillomavirus type 59

<400> 25

Met Ala Arg Phe Glu Asp Pro Thr Gln Arg Pro Tyr Lys Leu Pro Asp
 1 5 10 15

Leu Ser Thr Thr Leu Asn Ile Pro Leu His Asp Ile Arg Ile Asn Cys
 20 25 30

Val Phe Cys Lys Gly Glu Leu Gln Glu Arg Glu Val Phe Glu Phe Ala
 35 40 45

Phe Asn Asp Leu Phe Ile Val Tyr Arg Asp Cys Thr Pro Tyr Ala Ala
 50 55 60

Cys Leu Lys Cys Ile Ser Phe Tyr Ala Arg Val Arg Glu Leu Arg Tyr
 65 70 75 80

Tyr Arg Asp Ser Val Tyr Gly Glu Thr Leu Glu Ala Glu Thr Lys Thr
 85 90 95

Pro Leu His Glu Leu Leu Ile Arg Cys Tyr Arg Cys Leu Lys Pro Leu
 100 105 110

Cys Pro Thr Asp Lys Leu Lys His Ile Thr Glu Lys Arg Arg Phe His
 115 120 125

Asn Ile Ala Gly Ile Tyr Thr Gly Gln Cys Arg Gly Cys Arg Thr Arg
 130 135 140

Ala Arg His Leu Arg Gln Gln Arg Gln Ala Arg Ser Glu Thr Leu Val
 145 150 155 160

<210> 26
 <211> 158
 <212> PRT
 <213> Human papillomavirus type 68

<400> 26

Met Ala Leu Phe His Asn Pro Glu Glu Arg Pro Tyr Lys Leu Pro Asp
 1 5 10 15

Leu Cys Arg Thr Leu Asp Thr Thr Leu His Asp Val Thr Ile Asp Cys
 20 25 30

Val Tyr Cys Arg Arg Gln Leu Gln Arg Thr Glu Val Tyr Glu Phe Ala
 Page 20

35

40

Phe Ser Asp Leu Cys Val Val Tyr Arg Asp Gly Val Pro Phe Ala Ala
50 55 60

Cys Gln Ser Cys Ile Lys Phe Tyr Ala Lys Ile Arg Glu Leu Arg Tyr
65 70 75 80

Tyr Ser Glu Ser Val Tyr Ala Thr Thr Leu Glu Thr Ile Thr Asn Thr
85 90 95

Lys Leu Tyr Asn Leu Leu Ile Arg Cys Met Ser Cys Leu Lys Pro Leu
100 105 110

Cys Pro Ala Glu Lys Leu Arg His Leu Thr Thr Lys Arg Arg Leu His
115 120 125

Lys Ile Ala Gly Asn Phe Thr Gly Gln Cys Arg His Cys Trp Thr Ser
130 135 140

Lys Arg Glu Asp Arg Arg Arg Ile Arg Gln Glu Thr Gln Val
145 150 155

<210> 27
<211> 105
<212> PRT
<213> Human papillomavirus type 18

<400> 27

Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu Glu
1 5 10 15

Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu Ser
20 25 30

Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln His
35 40 45

Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys Met
50 55 60

Cys Cys Lys Cys Glu Ala Arg Ile Lys Leu Val Val Glu Ser Ser Ala
65 70 75 80

Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser Phe
85 90 95

Val Cys Pro Trp Cys Ala Ser Gln Gln

100

105

<210> 28
 <211> 98
 <212> PRT
 <213> Human papillomavirus type 31

<400> 28

Met Arg Gly Glu Thr Pro Thr Leu Gln Asp Tyr Val Leu Asp Leu Gln
 1 5 10 15

Pro Glu Ala Thr Asp Leu His Cys Tyr Glu Gln Leu Pro Asp Ser Ser
 20 25 30

Asp Glu Glu Asp Val Ile Asp Ser Pro Ala Gly Gln Ala Glu Pro Asp
 35 40 45

Thr Ser Asn Tyr Asn Ile Val Thr Phe Cys Cys Gln Cys Lys Ser Thr
 50 55 60

Leu Arg Leu Cys Val Gln Ser Thr Gln Val Asp Ile Arg Ile Leu Gln
 65 70 75 80

Glu Leu Leu Met Gly Ser Phe Gly Ile Val Cys Pro Asn Cys Ser Thr
 85 90 95

Arg Leu

<210> 29
 <211> 97
 <212> PRT
 <213> Human papillomavirus type 33

<400> 29

Met Arg Gly His Lys Pro Thr Leu Lys Glu Tyr Val Leu Asp Leu Tyr
 1 5 10 15

Pro Glu Pro Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Ser Asp Ser Ser
 20 25 30

Asp Glu Asp Glu Gly Leu Asp Arg Pro Asp Gly Gln Ala Gln Pro Ala
 35 40 45

Thr Ala Asp Tyr Tyr Ile Val Thr Cys Cys His Thr Cys Asn Thr Thr
 50 55 60

Val Arg Leu Cys Val Asn Ser Thr Ala Ser Asp Leu Arg Thr Ile Gln
 65 70 75 80

SEQUEN~1.TXT

Gln Leu Leu Met Gly Thr Val Asn Ile Val Cys Pro Thr Cys Ala Gln
85 90 95

Gln

<210> 30
<211> 99
<212> PRT
<213> Human papillomavirus type 35

<400> 30

Met His Gly Glu Ile Thr Thr Leu Gln Asp Tyr Val Leu Asp Leu Glu
1 5 10 15

Pro Glu Ala Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Cys Asp Ser Ser
20 25 30

Glu Glu Glu Glu Asp Thr Ile Asp Gly Pro Ala Gly Gln Ala Lys Pro
35 40 45

Asp Thr Ser Asn Tyr Asn Ile Val Thr Ser Cys Cys Lys Cys Glu Ala
50 55 60

Thr Leu Arg Leu Cys Val Gln Ser Thr His Ile Asp Ile Arg Lys Leu
65 70 75 80

Glu Asp Leu Leu Met Gly Thr Phe Gly Ile Val Cys Pro Gly Cys Ser
85 90 95

Gln Arg Ala

<210> 31
<211> 109
<212> PRT
<213> Human papillomavirus type 39

<400> 31

Met Arg Gly Pro Lys Pro Thr Leu Gln Glu Ile Val Leu Asp Leu Cys
1 5 10 15

Pro Tyr Asn Glu Ile Gln Pro Val Asp Leu Val Cys His Glu Gln Leu
20 25 30

Gly Glu Ser Glu Asp Glu Ile Asp Glu Pro Asp His Ala Val Asn His
35 40 45

SEQUEN~1.TXT

Gln His Gln Leu Leu Ala Arg Arg Asp Glu Pro Gln Arg His Thr Ile
50 55 60

Gln Cys Ser Cys Cys Lys Cys Asn Asn Thr Leu Gln Leu Val Val Glu
65 70 75 80

Ala Ser Arg Asp Thr Leu Arg Gln Leu Gln Gln Leu Phe Met Asp Ser
85 90 95

Leu Gly Phe Val Cys Pro Trp Cys Ala Thr Ala Asn Gln
100 105

<210> 32
<211> 106
<212> PRT
<213> Human papillomavirus type 45

<400> 32

Met His Gly Pro Arg Glu Thr Leu Gln Glu Ile Val Leu His Leu Glu
1 5 10 15

Pro Gln Asn Glu Leu Asp Pro Val Asp Leu Leu Cys Tyr Glu Gln Leu
20 25 30

Ser Glu Ser Glu Glu Glu Asn Asp Glu Ala Asp Gly Val Ser His Ala
35 40 45

Gln Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Lys Ile Leu Cys
50 55 60

Val Cys Cys Lys Cys Asp Gly Arg Ile Glu Leu Thr Val Glu Ser Ser
65 70 75 80

Ala Glu Asp Leu Arg Thr Leu Gln Gln Leu Phe Leu Ser Thr Leu Ser
85 90 95

Phe Val Cys Pro Trp Cys Ala Thr Asn Gln
100 105

<210> 33
<211> 101
<212> PRT
<213> Human papillomavirus type 51

<400> 33

Met Arg Gly Asn Val Pro Gln Leu Lys Asp Val Val Leu His Leu Thr
1 5 10 15

SEQUEN~1.TXT

Pro Gln Thr Glu Ile Asp Leu Gln Cys Tyr Glu Gln Phe Asp Ser Ser
20 25 30

Glu Glu Glu Asp Glu Val Asp Asn Met Arg Asp Gln Leu Pro Glu Arg
35 40 45

Arg Ala Gly Gln Ala Thr Cys Tyr Arg Ile Glu Ala Pro Cys Cys Arg
50 55 60

Cys Ser Ser Val Val Gln Leu Ala Val Glu Ser Ser Gly Asp Thr Leu
65 70 75 80

Arg Val Val Gln Gln Met Leu Met Gly Glu Leu Ser Leu Val Cys Pro
85 90 95

Cys Cys Ala Asn Asn
100

<210> 34
<211> 99
<212> PRT
<213> Human papillomavirus type 52

<400> 34

Met Arg Gly Asp Lys Ala Thr Ile Lys Asp Tyr Ile Leu Asp Leu Gln
1 5 10 15

Pro Glu Thr Thr Asp Leu His Cys Tyr Glu Gln Leu Gly Asp Ser Ser
20 25 30

Asp Glu Glu Asp Thr Asp Gly Val Asp Arg Pro Asp Gly Gln Ala Glu
35 40 45

Gln Ala Thr Ser Asn Tyr Tyr Ile Val Thr Tyr Cys His Ser Cys Asp
50 55 60

Ser Thr Leu Arg Leu Cys Ile His Ser Thr Ala Thr Asp Leu Arg Thr
65 70 75 80

Leu Gln Gln Met Leu Leu Gly Thr Leu Gln Val Val Cys Pro Gly Cys
85 90 95

Ala Arg Leu

<210> 35
<211> 105
<212> PRT
<213> Human papillomavirus type 56

SEQUEN~1.TXT

<400> 35

Met His Gly Lys Val Pro Thr Leu Gln Asp Val Val Leu Glu Leu Thr
1 5 10 15

Pro Gln Thr Glu Ile Asp Leu Gln Cys Asn Glu Gln Leu Asp Ser Ser
20 25 30

Glu Asp Glu Asp Glu Asp Glu Val Asp His Leu Gln Glu Arg Pro Gln
35 40 45

Gln Ala Arg Gln Ala Lys Gln His Thr Cys Tyr Leu Ile His Val Pro
50 55 60

Cys Cys Glu Cys Lys Phe Val Val Gln Leu Asp Ile Gln Ser Thr Lys
65 70 75 80

Glu Asp Leu Arg Val Val Gln Gln Leu Leu Met Gly Ala Leu Thr Val
85 90 95

Thr Cys Pro Leu Cys Ala Ser Ser Asn
100 105

<210> 36

<211> 98

<212> PRT

<213> Human papillomavirus type 58

<400> 36

Met Arg Gly Asn Asn Pro Thr Leu Arg Glu Tyr Ile Leu Asp Leu His
1 5 10 15

Pro Glu Pro Thr Asp Leu Phe Cys Tyr Glu Gln Leu Cys Asp Ser Ser
20 25 30

Asp Glu Asp Glu Ile Gly Leu Asp Gly Pro Asp Gly Gln Ala Gln Pro
35 40 45

Ala Thr Ala Asn Tyr Tyr Ile Val Thr Cys Cys Tyr Thr Cys Gly Thr
50 55 60

Thr Val Arg Leu Cys Ile Asn Ser Thr Thr Thr Asp Val Arg Thr Leu
65 70 75 80

Gln Gln Leu Leu Met Gly Thr Cys Thr Ile Val Cys Pro Ser Cys Ala
85 90 95

Gln Gln

SEQUEN~1.TXT

<210> 37
 <211> 107
 <212> PRT
 <213> Human papillomavirus type 59

<400> 37

Met His Gly Pro Lys Ala Thr Leu Cys Asp Ile Val Leu Asp Leu Glu
 1 5 10 15

Pro Gln Asn Tyr Glu Glu Val Asp Leu Val Cys Tyr Glu Gln Leu Pro
 20 25 30

Asp Ser Asp Ser Glu Asn Glu Lys Asp Glu Pro Asp Gly Val Asn His
 35 40 45

Pro Leu Leu Leu Ala Arg Arg Ala Glu Pro Gln Arg His Asn Ile Val
 50 55 60

Cys Val Cys Cys Lys Cys Asn Asn Gln Leu Gln Leu Val Val Glu Thr
 65 70 75 80

Ser Gln Asp Gly Leu Arg Ala Leu Gln Gln Leu Phe Met Asp Thr Leu
 85 90 95

Ser Phe Val Cys Pro Leu Cys Ala Ala Asn Gln
 100 105

<210> 38
 <211> 110
 <212> PRT
 <213> Human papillomavirus type 68

<400> 38

Met His Gly Pro Lys Pro Thr Val Gln Glu Ile Val Leu Glu Leu Cys
 1 5 10 15

Pro Tyr Asn Glu Ile Gln Pro Val Asp Leu Val Cys His Glu Gln Leu
 20 25 30

Gly Asp Ser Asp Asp Glu Ile Asp Glu Pro Asp His Ala Val Asn His
 35 40 45

His Gln His Leu Leu Leu Ala Arg Arg Asp Glu Gln Gln Arg His Arg
 50 55 60

Ile Gln Cys Leu Cys Cys Lys Cys Asn Lys Ala Leu Gln Leu Val Val
 65 70 75 80

SEQUEN~1.TXT

Glu Ala Ser Arg Asp Asn Leu Arg Thr Leu Gln Gln Leu Phe Met Asp
85 90 95

Ser Leu Asn Phe Val Cys Pro Trp Cys Ala Thr Glu Thr Gln
100 105 110

<210> 39
<211> 152
<212> PRT
<213> Human papillomavirus

<220>
<221> MISC_FEATURE
<222> (1)..(152)
<223> where Xaa is any amino acid

<400> 39

Xaa Xaa Xaa Phe Glx Asp Pro Xaa Glu Arg Pro Xaa Lys Leu Xaa Asp
1 5 10 15

Leu Cys Xaa Xaa Leu Xaa Xaa Xaa Xaa His Asx Ile Xaa Xaa Xaa Cys
20 25 30

Val Tyr Cys Lys Xaa Glx Leu Glx Arg Xaa Glu Val Tyr Xaa Phe Ala
35 40 45

Phe Xaa Asp Leu Xaa Ile Val Tyr Arg Asp Xaa Xaa Pro Xaa Ala Xaa
50 55 60

Cys Xaa Xaa Cys Leu Xaa Phe Tyr Ser Lys Ile Xaa Glu Xaa Arg Xaa
65 70 75 80

Tyr Xaa Xaa Ser Val Tyr Gly Xaa Thr Leu Glu Xaa Xaa Thr Xaa Lys
85 90 95

Xaa Leu Xaa Asx Leu Leu Ile Arg Cys Xaa Xaa Cys Gln Xaa Pro Leu
100 105 110

Cys Pro Xaa Glu Lys Xaa Arg His Xaa Asx Xaa Lys Xaa Arg Phe His
115 120 125

Asn Ile Xaa Gly Xaa Trp Thr Gly Xaa Cys Xaa Xaa Cys Trp Xaa Xaa
130 135 140

Xaa Arg Xaa Xaa Xaa Xaa Xaa Xaa
145 150

SEQUEN~1.TXT

<210> 40
 <211> 104
 <212> PRT
 <213> Human papillomavirus

<220>
 <221> MISC_FEATURE
 <222> (1)..(104)
 <223> where Xaa is any amino acid

<400> 40

Met Xaa Gly Xaa Xaa Pro Thr Leu Xaa Xaa Xaa Val Leu Asp Leu Xaa
 1 5 10 15

Pro Glx Xaa Xaa Xaa Asp Leu Xaa Cys Tyr Glu Gln Leu Xaa Asp Ser
 20 25 30

Xaa Xaa Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Xaa Ile Xaa Xaa Xaa Cys
 50 55 60

Cys Xaa Cys Xaa Xaa Xaa Xaa Xaa Leu Xaa Val Glx Ser Xaa Xaa Xaa
 65 70 75 80

Asp Leu Arg Xaa Leu Gln Gln Leu Leu Met Gly Thr Leu Xaa Xaa Val
 85 90 95

Cys Pro Xaa Cys Ala Xaa Xaa Xaa
 100

<210> 41
 <211> 9
 <212> PRT
 <213> Human papillomavirus type 16

<400> 41

Arg Ala His Tyr Asn Ile Val Thr Phe
 1 5

<210> 42
 <211> 477
 <212> DNA
 <213> Human papillomavirus type 18

<400> 42
 atggcgcgct ttgaggatcc aacacggcga ccctacaagc tacctgatct gtgcacggaa 60
 ctgaacactt cactgcaaga catagaaata acctgtgtat attgcaagac agtattggaa 120
 cttacagagg tatttgaatt tgcatttaaa gatttatttg tggtgtatag agacagtata 180

SEQUEN~1.TXT

ccccatgctg catgccataa atgtatagat ttttattcta gaattagaga attaagacat 240
tattcagact ctgtgtatgg agacacattg gaaaaactaa ctaacactgg gttatacaat 300
ttattaataa ggtgcctgcg gtgccagaaa ccgttgaatc cagcagaaaa acttagacac 360
cttaatgaaa aacgacgatt tcacaacata gctgggcact atagaggcca gtgccattcg 420
tgctgcaacc gagcacgaca ggaacgactc caacgacgca gagaaacaca agtataa 477

<210> 43
<211> 474
<212> DNA
<213> Human papillomavirus type 31

<400> 43
atgttcaaaa atcctgcaga aagacctcgg aaattgcatg aactaagctc ggcattggaa 60
ataccctacg atgaactaag attgaattgt gtctactgca aaggtcagtt aacagaaaca 120
gaggtattag attttgcatt tacagattta acaatagtat atagggacga cacaccacac 180
ggagtgtgta caaaatgttt aagattttat tcaaaagtaa gtgaatttag atggtataga 240
tatagtgtgt atggaacaac attagaaaaa ttgacaaaca aaggatatatg tgatttgta 300
attaggtgta taacgtgtca aagaccgttg tgtccagaag aaaaacaaag acatttggat 360
aaaaagaaac gattccaca cataggagga aggtggacag gacgttgcac agcatgttgg 420
agaagacctc gtactgaaac ccaagtgtaa acatgcgttg agaaacacct acgt 474

<210> 44
<211> 450
<212> DNA
<213> Human papillomavirus type 33

<400> 44
atgtttcaag aactgagga aaaaccacga acattgcatg atttgtgcca agcattggag 60
acaactatac acaacattga actacagtgc gtggaatgca aaaaaccttt gcaacgatct 120
gaggtatatg attttgcatt tgcagattta acagttgtat atagagaggg aaatccattt 180
ggaatatgta aactgtgttt gcggttctta tctaaaatta gtgaatatag acattataat 240
tattctgtat atggaaatac attagaacaa acagttaaaa aacctttaaa tgaaatatta 300
attaggtgta ttatatgtca aagacctttg tgcctcaag aaaaaaacg acatgtggat 360
ttaaacaac gatttcataa tatttcgggt cgttgggcag ggcgctgtgc ggcgtgttgg 420
aggtcccgac gtagagaaac tgcactgtga 450

<210> 45
<211> 450
<212> DNA
<213> Human papillomavirus type 35

SEQUEN~1.TXT

<400> 45
atgtttcagg acccagctga acgaccttac aaactgcatg atttgtgcaa cgaggtagaa 60
gaaagcatcc atgaaatttg tttgaattgt gtatactgca aacaagaatt acagcggagt 120
gaggtatatg actttgcatg ctatgatttg tgtatagtat atagagaagg ccagccatat 180
ggagtatgca tgaaatgttt aaaattttat tcaaaaataa gtgaatatag atgggtataga 240
tatagtgtgt atggagaaac gttagaaaaa caatgcaaca aacagttatg tcatttatta 300
attaggtgta ttacatgtca aaaaccgctg tgtccagttg aaaagcaaag acatttagaa 360
gaaaaaaaaac gattccataa catcggtgga cgggtggacag gtcggtgtat gtcctgttgg 420
aaaccaacac gtagagaaac cgaggtgtaa 450

<210> 46
<211> 477
<212> DNA
<213> Human papillomavirus type 39

<400> 46
atggcgcgat ttcacaatcc tgcagaacgg ccatacaaat tgccagacct gtgcacaacg 60
ctggacacca ccttgtagga cattacaata gcctgtgtct attgcagacg accactacag 120
caaaccgagg tatatgaatt tgcatttagt gatttatatg tagtatatag ggacggggaa 180
ccactagctg catgccaatc atgtataaaa ttttatgcta aaatacggga gctacgatat 240
tactcggact cgggtgtatgc aactacatta gaaaatataa ctaatacaaa gttatataat 300
ttattaataa ggtgcatgtg ttgtctgaaa ccgctgtgtc cagcagaaaa attaagacac 360
ctaaatagca aacgaagatt tcataaaata gcaggaagct atacaggaca gtgtcgacgg 420
tgctggacca caaacggga ggaccgcaga ctaacacgaa gagaaaccca agtataa 477

<210> 47
<211> 477
<212> DNA
<213> Human papillomavirus type 45

<400> 47
atggcgcgct ttgacgatcc aaagcaacga ccctacaagc taccagattt gtgcacagaa 60
ttgaatacat cactacaaga cgtatctatt gcctgtgtat attgcaaagc aacattggaa 120
cgcacagagg tatatcaatt tgctttttaa gatttatgta tagtgtatag agactgtata 180
gcatatgctg catgccataa atgtatagac ttttattcca gaattagaga attaagatat 240
tattcaaact ctgtatatgg agagacactg gaaaaataa ctaatacaga gttgtataat 300
ttgttaataa ggtgcctgcg gtgccagaaa ccattgaacc cagcagaaaa acgtagacac 360
cttaaggaca aacgaagatt tcacagcata gctggacagt accgagggca gtgtaataca 420
tgttgtgacc aggcacggca agaaagactt cgcagacgta gggaaacaca agtatag 477

SEQUEN~1.TXT

<210> 48
 <211> 456
 <212> DNA
 <213> Human papillomavirus type 51

<400> 48
 atgttcgaag acaagagggga aagaccacga acgctgcatg aattatgtga agctttgaac 60
 gtttctatgc acaatataca ggtagtggtg gtgtattgta aaaaggaatt atgtagagca 120
 gatgtatata atgtagcatt tactgaaatt aagattgtat atagggataa taatccatat 180
 gcagtatgca aacaatgttt actgttttat tcaaaaatta gagagtatag acgttatagc 240
 aggtctgtgt atggtactac attagaggca attactaaaa aaagcttata tgatttatcg 300
 ataaggtgtc atagatgtca aagaccactt gggcctgaag aaaagcaaaa attggtggac 360
 gaaaaaaaaa ggttccatga aatagcggga cgttggacgg ggcaatgcgc taattgctgg 420
 caacgtacac gacaacgtaa cgaaacccaa gtgtaa 456

<210> 49
 <211> 447
 <212> DNA
 <213> Human papillomavirus type 52

<400> 49
 atgtttgagg atccagcaac acgaccccgg accctgcacg aattgtgtga ggtgctggaa 60
 gaatcgggtg atgaaataag gctgcagtgt gtgcagtgc aaaaagagct acaacgaaga 120
 gaggtataca agtttctatt tacagattta cgaatagtat atagagacaa taatccatat 180
 ggcgtgtgta ttatgtgcct acgcttttta tctaagataa gtgaatatag gcattatcaa 240
 tattcactgt atgggaaaac attagaagag agggtaaaaa aaccattaag tgaaataact 300
 attagatgta taatttgta aacgccatta tgtcctgaag aaaaagaaag acatgttaat 360
 gcaaacaaagc gatttcataa tattatgggt cgttggacag ggcgctgttc agagtgttgg 420
 agaccccgac ctgtgacca agtgtaa 447

<210> 50
 <211> 465
 <212> DNA
 <213> Human papillomavirus type 56

<400> 50
 atggagccac aattcaacaa tccacaggaa cgtccacgaa gcctgcacca cttgagtga 60
 gtattagaaa tacctttaat tgatcttaga ttatcatgtg tatattgcaa aaaagaacta 120
 acacgtgctg aggtatataa ttttgcattg actgaattaa aattagtgt tagggatgat 180
 tttccttatg cagtgtgcag agtatgttta ttgtttata gttaaagttag aaaatatagg 240
 tattatgact attcagtgtg tggagctaca ctagaaagta taactaaaaa acagttatgt 300

SEQUEN~1.TXT

gatttatttaa taagggtgcta cagatgtcaa agtccggttaa ctccggagga aaagcaattg 360
cattgtgaca gaaaaagacg atttcatcta atagcacatg gttggaccgg gtcattgtttg 420
gggtgctgga gacaaacatc tagagaacct agagaatcta cagta 465

<210> 51
<211> 450
<212> DNA
<213> Human papillomavirus type 58

<400> 51
atgttccagg acgcagagga gaaaccacgg acattgcatg atttgtgtca ggcgttggag 60
acatctgtgc atgaaatcga attgaaatgc gttgaatgca aaaagacttt gcagcgatct 120
gaggtatatg actttgtatt tgcagattta agaatagtgt atagagatgg aaatccattt 180
gcagtatgta aagtgtgctt acgattgcta tctaaaataa gtgagtatag acattataat 240
tattcgtat atggagacac attagaacaa aactaaaaa agtgttttaa tgaaatatta 300
attagatgta ttatttgtca aagaccattg tgtccacaag aaaaaaaaag gcatgtggat 360
ttaaacaaaa ggtttcataa tatttcgggt cgttggacag ggcgctgtgc agtgtgttgg 420
agaccccgac gtagacaaac acaagtgtaa 450

<210> 52
<211> 483
<212> DNA
<213> Human papillomavirus type 59

<400> 52
atggcacgct ttgaggatcc tacacaacga ccatacaaac tgcctgattt gagcacaaca 60
ttgaatatcc ctctgcatga tattcgcata aattgtgtgt ttgcaaagg ggaactgcaa 120
gaaagagagg tatttgaatt tgcttttaaat gacttattta tagtgtatag agactgtaca 180
ccgtatgcag cgtgtctgaa atgcatttca ttttatgcaa gagtaagaga attaagatat 240
tatagagatt ccgtgtatgg agaaacatta gaggctgaaa ccaagacacc gttacatgag 300
ctgctgatac gctgttatag atgcctaaaa cctctatgtc caacagataa attaaagcat 360
ataactgaaa aaagaagatt ccataatata gctggaatat atacaggaca gtgtcgtggg 420
tgtcggaccc gagcaagaca cctaagacag caacgacaag cgcgtagtga aacactggtg 480
taa 483

<210> 53
<211> 477
<212> DNA
<213> Human papillomavirus type 68

<400> 53
atggcgctat ttcacaaccc tgaggaacgg ccatacaaat tgccagacct gtgcaggaca 60

SEQUEN~1.TXT

| | |
|---------------------------------------------------------------------|-----|
| ttggacacta cattgcatga cgttacaata gactgtgtct attgcagaag gcaactacaa | 120 |
| cggacagagg tatatgaatt tgcctttagt gacctatgtg tagtgtatag agacggggta | 180 |
| ccatttgctg catgccaatc atgtattaaa ttttatgcta aaatacggga actacgatat | 240 |
| tactcggaaat cgggtgtatgc aactacatta gaaaccataa ctaatacaaa gttatataat | 300 |
| ttattgataa ggtgcatgag ttgcctgaaa ccatttgtgc cagcagaaaa actaaggcac | 360 |
| ctaacaacaa aacgaagatt acataaaaata gcaggaaact ttacaggaca gtgtcggcac | 420 |
| tgctggacca gtaagcgaga ggaccgcaga cgcatacgtc aagaaacaca agtttaa | 477 |

<210> 54
 <211> 318
 <212> DNA
 <213> Human papillomavirus type 18

| | |
|-------------------------------------------------------------------|-----|
| <400> 54 | |
| atgcatggac ctaaggcaac attgcaagac attgtattgc atttagagcc ccaaaatgaa | 60 |
| attccggttg accttctatg tcacgagcaa ttaagcgact cagaggaaga aaacgatgaa | 120 |
| atagatggag ttaatcatca acatttacca gcccgcagag ccgaaccaca acgtcacaca | 180 |
| atgttgtgta tgtgttgtaa gtgtgaagcc agaattaagc tagtagtaga aagctcagca | 240 |
| gacgaccttc gagcattcca gcagctgttt ctgaacaccc tgtcctttgt gtgtccgtgg | 300 |
| tgtgcatccc agcagtaa | 318 |

<210> 55
 <211> 297
 <212> DNA
 <213> Human papillomavirus type 31

| | |
|-------------------------------------------------------------------|-----|
| <400> 55 | |
| atgcgtggag aaacacctac gttgcaagac tatgtgttag atttgcaacc tgaggcaact | 60 |
| gacctccact gttatgagca attacccgac agctcagatg aggaggatgt catagacagt | 120 |
| ccagctggac aagcagaacc ggacacatcc aattacaata tcgttacctt ttgttgtcag | 180 |
| tgtaagtcta cacttcgttt gtgtgtacag agcacacaag tagatattcg catattgcaa | 240 |
| gagctgttaa tgggctcatt tggaatcgtg tgccccaact gttctactag actgtaa | 297 |

<210> 56
 <211> 294
 <212> DNA
 <213> Human papillomavirus type 33

| | |
|-------------------------------------------------------------------|-----|
| <400> 56 | |
| atgagaggac acaagccaac gttaaaggaa tatgttttag atttatatcc tgaaccaact | 60 |
| gacctatact gctatgagca attaagtgac agctcagatg aggatgaagg cttggaccgg | 120 |
| ccagatggac aagcacaacc agccacagct gattactaca ttgtaacctg ttgtcacact | 180 |

SEQUEN~1.TXT

| | |
|-------------------------------------------------------------------|-----|
| tgtaacacca cagttcgttt atgtgtcaac agtacagcaa gtgacctacg aaccatacag | 240 |
| caactactta tgggcacagt gaatattgtg tgcctacct gtgcacaaca ataa | 294 |

<210> 57
 <211> 300
 <212> DNA
 <213> Human papillomavirus type 35

| | |
|--------------------------------------------------------------------|-----|
| <400> 57 | |
| atgcatggag aaataactac attgcaagac tatgttttag atttggaacc cgaggcaact | 60 |
| gacctatact gttatgagca attgtgtgac agctcagagg aggaggaaga tactattgac | 120 |
| gggtccagctg gacaagcaaa accagacacc tccaattata atattgtaac gtcctgttgt | 180 |
| aaatgtgagg cgacactacg tctgtgtgta cagagcacac acattgacat acgtaaattg | 240 |
| gaagatttat taatgggcac atttggaata gtgtgccccg gctgttcaca gagagcataa | 300 |

<210> 58
 <211> 330
 <212> DNA
 <213> Human papillomavirus type 39

| | |
|-------------------------------------------------------------------|-----|
| <400> 58 | |
| atgcatggag caaagccac cttgcaggaa attgtattag atttatgtcc ttacaatgaa | 60 |
| atacagccgg ttgaccttgt atgtcacgag caattaggag agtcagagga tgaaatagat | 120 |
| gaacccgacc atgcagttaa tcaccaacat caactactag ccagacggga tgaaccacag | 180 |
| cgtcacacaa tacagtgttc gtgttgtaag tgtaacaaca cactgcagct ggtagtagaa | 240 |
| gcctcacggg atactctgcg acaactacag cagctgttta tggactcact aggatttgtg | 300 |
| tgtccgtggt gtgcaactgc aaaccagtaa | 330 |

<210> 59
 <211> 321
 <212> DNA
 <213> Human papillomavirus type 45

| | |
|-------------------------------------------------------------------|-----|
| <400> 59 | |
| atgcatggag cccgggaaac actgcaagaa attgtattgc atttggaacc tcagaatgaa | 60 |
| ttagatcctg ttgacctgtt gtgttacgag caattaagcg agtcagagga ggaaaacgat | 120 |
| gaagcagatg gagttagtca tgcacaacta ccagcccgac gagccgaacc acagcgtcac | 180 |
| aaaattttgt gtgtatgttg taagtgtgac ggcagaattg agcttacagt agagagctcg | 240 |
| gcagaggacc ttagaact acagcagctg tttttgagca ccttgtcctt tgtgtgtccg | 300 |
| tggtgtgcaa ctaaccaata a | 321 |

<210> 60
 <211> 306
 <212> DNA

SEQUEN~1.TXT

<213> Human papillomavirus type 51

<400> 60
 atgctgtgta atgtaccaca attaaaagat gtagtattgc atttaacacc acagactgaa 60
 attgacttgc aatgctacga gcaatttgac agctcagagg aggaggatga agtagataat 120
 atgctgacc agctaccaga aagacgggct ggacaggcta cgtgttacag aattgaagct 180
 ccgtgttgca ggtgttcaag tgtagtacia ctggcagtgg aaagcagtgg agacaccctt 240
 cgcgttgtag agcagatgtt aatgggagaa ctaagcctgg tttgcccgtg ttgtgcgaac 300
 aactag 306

<210> 61

<211> 300

<212> DNA

<213> Human papillomavirus type 52

<400> 61
 atgctgtgag acaaagcaac tataaaagat tatatattag atctgcaacc tgaaacaact 60
 gacctacact gctatgagca attaggtgac agctcagatg aggaggatac agatggtgtg 120
 gaccggccag atggacaagc agaacaagcc acaagcaatt actacattgt gacatattgt 180
 cacagttgtg atagcacact acggctatgc attcatagca ctgacgagga ccttcgtact 240
 ctacagcaaa tgctgttggg cacattacaa gttgtgtgcc ccggctgtgc acggctataa 300

<210> 62

<211> 318

<212> DNA

<213> Human papillomavirus type 56

<400> 62
 atgcatgta aagtaccaac gctgcaagac gttgtattag aactaacacc tcaaacagaa 60
 attgacctac agtgcaatga gcaattggac agctcagagg atgaggatga ggatgaagta 120
 gaccatttgc aggagcggcc acagcaagct agacaagcta aacaacatac gtgttaccta 180
 atacacgtac cttgttgtga gtgtaagttt gtgggtgcagt tggacattca gagtacaaa 240
 gaggacctgc gtgttgtaca acagctgctt atgggtgcgt taacagtaac gtgcccactc 300
 tgcgcatcaa gtaactaa 318

<210> 63

<211> 297

<212> DNA

<213> Human papillomavirus type 58

<400> 63
 atgagaggaa acaacccaac gctaagagaa tatatttttag atttacatcc tgaaccaact 60
 gacctattct gctatgagca attatgtgac agctcagacg aggatgaaat aggcttggac 120
 gggccagatg gacaagcaca accggccaca gctaattact acattgtaac ttgttggtac 180

SEQUEN~1.TXT

acttgtggca ccacggttcg tttgtgtatc aacagtacaa caaccgacgt acgaacccta 240
cagcagctgc ttatgggcac atgtaccatt gtgtgcccta gctgtgcaca gcaataa 297

<210> 64
<211> 324
<212> DNA
<213> Human papillomavirus type 59

<400> 64
atgcatggac caaaagcaac actttgtgac attgttttag atttgaacc acaaaattat 60
gaggaagttg accttgtgtg ctacgagcaa ttacctgact ccgactccga gaatgaaaaa 120
gatgaaccag atggagttaa tcatcctttg ctactagcta gacgagctga accacagcgt 180
cacaacattg tgtgtgtgtg ttgtaagtgt aataatcaac ttcagctagt agtagaaacc 240
tcgcaagacg gattgcgagc cttacagcag ctgtttatgg acacactatc ctttgtgtgt 300
cctttgtgtg cagcaaacca gtaa 324

<210> 65
<211> 333
<212> DNA
<213> Human papillomavirus type 68

<400> 65
atgcatggac caaagcccac cgtgcaggaa attgtgtag agctatgtcc atacaatgaa 60
atacagccgg ttgaccttgt atgtcacgag caattaggag attcagacga tgaaatagat 120
gaacccgacc atgcagttaa tcaccaccaa catctactac tagccagacg ggacgaacaa 180
cagcgtcaca gaattcagtg tctgtgttgt aagtgtaca aggactgca actagtagta 240
gaagcgtcgc gggacaacct gcggacacta caacagctgt ttatggactc actaaatttt 300
gtgtgtccgt ggtgtgcaac tgaaaccag taa 333